ACOUSTICAL ANALYSIS REPORT

Country Gardens II
2800 Overland Trail
Fallbrook, California 92028

County of San Diego Major Use Permit #P04-058; Log No. 04-02-053

Prepared For

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1.0 EXECUTIVE SUMMARY

The proposed project, Country Gardens II, consists of the construction of an assisted-living facility. The proposed facility will be a single-story building containing 27 specific use suites, including up to four as hospice dedicated, 2 offices, and an interior courtyard. The project site is located at 2800 Overland Trail, at the northwestern corner of the intersection of Overland Trail and South Mission Road, in the unincorporated area of Fallbrook, County of San Diego, California.

The primary noise sources in the vicinity of the project site include automobile and truck traffic noise from South Mission Road and aircraft noise from Fallbrook Community Airpark. Aircraft overflight noise associated with the Fallbrook Community Airpark has been evaluated and is considered insignificant as the project site has a perpendicular distance of approximately 0.9 miles from the closest corner of the project to the axis of the main runway at the Fallbrook Community Airport. Therefore, the project site is located outside of the projected future 2010 55 CNEL airport noise contour. The current calculated on-site traffic noise level at the eastern property line of the project site is 72.7 Community Noise Equivalent Level (CNEL). Due to a projected increase in traffic volume, the future (year 2020) traffic noise level at the eastern property line of the project site is expected to increase to 74.3 CNEL.

Without mitigation, due to intervening project building structures, future traffic noise levels at the proposed courtyard outdoor use recreational area will be 50.2 CNEL. Mitigation to provide an exterior traffic noise level below 60 CNEL will not be necessary.

Calculations show that future traffic noise levels at the building facades will range from 45.6 CNEL at the west-facing facade near Unit 1 to 70.3 CNEL at the east-facing facade near Units 20 and 21. Speed limit and truck percentages for South Mission Road were updated and subsequently remodeled as per County reccomendation. Since future exterior on-site noise levels will exceed 60 CNEL at some building facades, an exterior-to-interior noise analysis was conducted to evaluate the sound reduction properties of proposed exterior wall, window, and door construction designs. Due to the elevated exterior noise levels, unmitigated future interior noise levels in many of the habitable rooms with a view of South Mission Road would exceed the 45 CNEL interior noise limit for habitable residential space and 50 CNEL for office space.

Mechanical ventilation, which allows windows to be closed for an extended length of time, is a necessary element to achieve future interior noise levels below 45 CNEL in habitable residential space with windows closed, in compliance with the State of California Building Code requirements. For further details on mitigation recommendations, please refer to Section 5.0 of this report.

There are currently two proposed exterior mechanical ventilation units. These units are “Carrier Residential HVAC: MODEL 38YCC (6O Hz.)” Specifications for this unit are included in Appendix K: Preliminary Mechanical Plan Showing All Major Noise Generators and Locations. This Appendix includes a site map indicating the locations of these two units.

Calculations were performed to determine the CNEL increase from existing traffic noise impacts along South Mission Road to those with the additional heavy truck traffic for the initial site grading operations. These calculations show a traffic noise increase of 0.1 dB. This increase to overall existing vehicle traffic noise is less than 3 dB, and therefore considered an insignificant impact.

The County guideline regarding noise generated by project-related traffic states that in urbanized residential areas with an existing traffic noise level of 60 CNEL or less, an increase to greater than 60 CNEL due to project-related traffic is considered significant. For areas with an existing traffic noise above 60 CNEL, an increase of 3 dB or more due to project-related traffic is considered significant. Calculations show a maximum traffic noise increase of 0.03 dB for existing plus project generated

traffic. These increases to overall vehicle traffic noise to the surrounding area are less than 3 dB, and are therefore considered an insignificant impact.

The project-related construction noise is expected to only occasionally exceed background noise levels for short durations. Grading operations should take seven days to complete. When the heavy equipment is operated simultaneously for 10% of an 8 hour time period, the average 8-hour equivalent noise level will be as high as 75 dBA at the southern property line. The average 8-hour equivalent noise level will be as high as 72 dBA at the nearest residential property at a distance of 50 feet south of the southern project property line near the facade of the residence. The average 8-hour equivalent noise level will not exceed the 75 dB noise limit at the western, northern, and eastern property lines. Therefore, no temporary construction noise mitigation is required due to projected grading operations at the project site.

According to Tom Edgemon, a selective, single event blasting operation will not be necessary during the initial grading activities. Therefore, no additional temporary construction activity mitigation will be necessary.

2.0 INTRODUCTION

This acoustical analysis report is submitted to satisfy the acoustical requirements of the County of San Diego for a Major Use Permit. Its purpose is to assess noise impacts from nearby roadway traffic and airport operations, and to identify project features or requirements necessary to achieve exterior noise levels of 60 CNEL or less in outdoor use areas and interior noise levels of 45 CNEL or less in habitable residential space and 50 CNEL or less in office space, in compliance with the State of California noise regulations. Temporary construction noise impact issues will also be addressed due to projected grading operations on the project site.

All noise level or sound level values presented herein are expressed in terms of decibels, with A-weighting to approximate the hearing sensitivity of humans. Time-averaged noise levels are expressed by the symbol L_{EQ}, for a specified duration. The CNEL is a 24-hour average, where sound levels during evening hours of 7:00 p.m. to 10:00 p.m. have an added 5 dB weighting, and sound levels during nighttime hours of 10:00 p.m. to 7:00 a.m. have an added 10 dB weighting. This is similar to the Day-Night sound level, L_{DN}, which is a 24-hour average with an added 10 dB weighting on the same nighttime hours but no added weighting on the evening hours. Sound levels expressed in CNEL are always based on A-weighted decibels. These metrics are used to express noise levels for both measurement and municipal regulations, for land use guidelines, and for enforcement of noise ordinances. Further explanation can be provided upon request.

2.1 Project Location

The project site is located at 2800 Overland Trail, at the northwestern corner of the intersection of Overland Trail and South Mission Road, in the unincorporated area of Fallbrook, County of San Diego, California. The Assessor's parcel number (APN) for the property is 123-010-52. The project site has a perpendicular distance of approximately 0.9 miles from the closest corner of the project to the axis of the main runway at the Fallbrook Community Airport. The overall property is rectangular in shape with an overall site area of approximately 87,120 square feet.

The project property is currently zoned for residential (RR2) use. Neighboring land uses in the proximity of the proposed project site are residential to the south and the west, with limited agricultural activities to the northwest and to the east, and commercial activities to the southeast. Two properties to the immediate south are zoned A-70 and the adjacent property, southeast along Mission Road is zoned C-36. As a result, the day/night applicable noise limit for these property lines, with the exception of the southeastern line, is the one-hour average sound level of 50/45 dBA. The day/night property line sound level limit next to the adjacent commercial property is 55/50 dBA. Appendix F, contains the applicable noise limits in detail. The project property is zoned for residential use, where all current land surrounding the project site zoned for agricultural is planned to be changed in the future to residential. A complete and current list of the adjacent existing land uses for this project is attached (See Appendix J: Adjacent Existing Land Uses.)

The project location is shown on the Thomas Guide Map, Figure 1, following this report. An Assessor's Parcel Map, Satellite Aerial Photograph, Topographic Map, and Planned Land Use Map of this area are also provided as Figures 2 through 5.

2.2 Project Description

The proposed project consists of the construction of an assisted-living facility. The proposed facility will be a single-story building containing 27 specific use suites, including up to four as hospice dedicated, 2 offices, and an interior courtyard.

3.0 ENVIRONMENTAL SETTING

3.1 Existing Noise Environment

The primary noise sources in the vicinity of the project site include automobile and truck traffic noise from South Mission Road and aircraft noise from Fallbrook Community Airpark. Aircraft overflight noise associated with the Fallbrook Community Airpark has been evaluated and is considered insignificant as the project site has a perpendicular distance of approximately 0.9 miles from the closest corner of the project to the axis of the main runway at the Fallbrook Community Airport. Therefore, the project site is located outside of the projected future 2010 55 CNEL airport noise contour. Please refer to Figure 6: Fallbrook Community Airpark Noise Contours Showing Project Location. No other noise source is considered significant.

South Mission Road is a two-lane, two-way Major Arterial roadway running north-south in the vicinity of the project site. The paved roadway width is approximately 44 feet, curb to curb. The posted speed limit is 50 mph. However, a speed limit of 55 mph was used for all models and projections, as per County of San Diego staff instruction. South Mission Road, in the vicinity of the project site, currently carries a traffic volume of approximately 19,822 Average Daily Trips (ADT), according to Justin Rasas of LOS Engineering.

The current calculated on-site traffic noise level at the eastern property line of the project site is 74.0 CNEL. Current and future traffic volumes for the roadway sections near the project site are shown in Table 1. For further roadway details and projected future ADT traffic volumes, please refer to Appendix A: Sound32 Data and Results.

Table 1. Overall Roadway Traffic Information

Roadway Name	Speed Limit (mph)		Current ADT	Future (2020) ADT
	Current	Future		
South Mission Road	55	55	19,822	21,304

No current or future truck percentages were available for this area. However, based on neighboring and surrounding land use, roadway classification, our professional experience and on-site observations, as well a recommendation from the County of San Diego, a truck percentage mix of 4.0% medium and 2.0% heavy trucks was used for South Mission Road (See Appendix A: Sound 32 Data and Results. Table 1.)

3.1.1 Measured Noise Level

An on-site inspection and traffic noise measurement were made on the morning of Monday, April 11, 2005. The weather conditions were as follows: clear skies, low humidity, temperatures in the high 60's with winds from the west at 2-4 mph. A “one-hour" equivalent measurement was made at the eastern property line near the corner of Overland Trail and South Mission Road. The microphone position was placed approximately five feet above the existing project site grade. Traffic volumes were recorded for automobiles, medium-size trucks, and large trucks during the measurement period. After a continuous 15-minute sound level measurement, there was no change in the L_{EQ} and results were then recorded. The measured noise level and related weather conditions are found in Table 2. The calculated equivalent hourly vehicle traffic count adjustment and a complete tabular listing of all traffic data recorded during the on-site traffic noise measurement are found in Appendix A: Sound32 Data and Results.

Table 2. On-Site Noise Measurement Conditions and Results	
Date	Monday, April 11, 2005
Time	10:30 a.m. - 10:45 a.m.
Conditions	Clear Skies, Winds from the West @ 2-4 mph, Temperature High 60's with Low Humidity
Measured Noise Level	70.9 dBA L_{EQ}

3.1.2 Calculated Noise Level

Noise levels were calculated for the site using the methodology described in Section 4.1 (see next page) for the location, conditions, and traffic volumes counted during the noise measurements. The calculated noise levels (L_{EQ}) were compared with the measured on-site noise level to determine if adjustments or corrections (calibration) should be applied to the traffic noise prediction model, Sound32. Adjustments are intended to account for site-specific differences, such as reflection and absorption, which may be greater or lesser than accounted for in the model.

The measured noise level of 70.9 dBA L_{EQ} for South Mission Road was compared to the calculated (modeled) noise level of 71.1 dBA L_{EQ}, for the same conditions and traffic flow. As there was only a 0.2 dBA difference between the measured and the calculated noise level, no adjustment was deemed necessary to model future noise levels for this location. Please refer to Table 3, for further evaluation.

Table 3. Calculated versus Measured Traffic Noise Data				
Roadways	**Calculated**	**Measured**	**Difference**	**Correction**
South Mission Road	71.1 dBA L_{EQ}	70.9 dBA L_{EQ}	0.2 dB	none

3.2 Future Noise Environment

The future (year 2020) traffic volumes for South Mission Road were obtained from Justin Rasas of LOS Engineering. The future (year 2020) traffic volume for South Mission Road is projected to be 21,304 ADT. The future (year 2020) traffic noise level at the eastern property line of the project site is expected to increase to 74.3 CNEL.

The same truck percentages from the existing traffic volumes were used for future traffic volume modeling. The roadway classification, speed limit, alignment and roadbed grade elevations are expected to remain the same for this section of South Mission Road. For further roadway details and projected future ADT traffic volumes, please refer to Appendix A: Sound32 Data and Results.

4.0 METHODOLOGY AND EQUIPMENT

4.1 Methodology

4.1.1 Field Measurement

Typically, a "one-hour" equivalent sound level measurement (L_{EQ}, A-Weighted) is recorded for at least one noise-sensitive location on the site. During the on-site noise measurement, start and end times are recorded, vehicle counts are made for cars, medium trucks (double-tires/two axles), and heavy trucks (three or more axles) for the corresponding road segment(s). Supplemental sound measurements of one hour or less in duration are often made to further describe the noise environment of the site.

For measurements of less than one hour in duration, the measurement time is long enough for a representative traffic volume to occur and the noise level (L_{EQ}) to stabilize; 15 minutes is usually sufficient for this purpose. The vehicle counts are then converted to one-hour equivalent volumes by using the appropriate multiplier.

Other field data gathered includes measuring or estimating distances, angles-of-view, slopes, elevations, roadway grades, and vehicle speeds. This data was checked against the available maps and records.

4.1.2 Roadway Noise Calculation

The Sound32 Release 1.41 program released by the California Department of Transportation, Division of New Technology, Materials and Research was used to calculate the future daytime average hourly noise level (HNL) at various locations at the project site. The daytime average hourly traffic volume is calculated as 0.058 times the ADT, based on the studies made by Wyle Laboratories (see reference). The HNL is equivalent to the L_{EQ}, and both are converted to the CNEL by adding 2.0 decibels, as shown in the Wyle Study. Future CNEL is calculated for desired receptor locations using future road alignment, elevations, lane configurations, projected traffic volumes, estimated truck mixes, and vehicle speeds. Noise attenuation methods may be analyzed, tested, and planned with Sound32, as required. Further explanation can be supplied on request.

4.1.3 Exterior-to-Interior Noise Calculation

The State Building Code, local municipalities, and other agencies (such as HUD) require an acoustical analysis for any multi-unit residential facility proposed in an area that has or will have exterior noise levels in excess of 60 CNEL. This analysis must demonstrate building features and mitigation that will provide interior noise levels of 45 CNEL or less for residential units, classrooms, or other habitable interior areas and 50 CNEL or less in office space. CNEL is considered synonymous with L_{DN}.

Analysis for the interior noise levels requires consideration of:

- Number of unique assemblies in the wall (doors, window/wall mount air conditioners, sliding glass doors, and windows)
- Size, number of units, and sound transmission data for each assembly type
- Length of sound impacted wall(s)
- Depth of sound impacted room
- Height of exterior wall of sound impacted room
- Exterior noise level at wall assembly or assemblies of sound impacted room

Modeling of exterior wall assemblies using building plan wall details is accomplished using INSUL Version 5.1, which is a model-based computer program developed by Marshall Day Acoustics for predicting the sound insulation of walls, floors, ceilings and windows. It is acoustically based on theoretical models that require only minimal material information that can make reasonable estimates of the sound transmission loss (TL) and Sound Transmission Class (STC) for use in sound insulation calculations, such as the design of common party walls and multiple family floor-ceiling assemblies, etc. INSUL can be used to quickly evaluate new materials or systems or investigate the effects of changes to existing designs. It models individual materials using the simple mass law and coincidence frequency approach and can model more complex assembly partitions, as well. It has evolved over several versions into an easy-to-use tool and has refined the theoretical models by continued comparison with laboratory tests to provide acceptable accuracy for a wide range of constructions. INSUL model performance comparisons with laboratory test data show that the model generally predicts the performance of a given assembly within 3 STC points.

The Composite Sound Transmission data is developed for the exterior wall(s) and the calculated noise exposure is converted to octave-band sound pressure levels (SPL) by addition of an octave data curve for typical traffic noise. The reduction in room noise due to absorption is calculated and subtracted from the interior octave noise levels, and the octave noise levels are logarithmically added to produce the overall interior room noise level. When interior noise levels exceed 45 CNEL, the noise reduction achieved by each element is reviewed to determine what changes will achieve the most cost-effective compliance. Windows are usually the first to be reviewed, followed by the doors, and then the walls.

4.1.4 Preliminary Mechanical Plan Calculation

There are currently two proposed exterior mechanical units. These units are “Carrier Residential HVAC: MODEL 38YCC (60 Hz.)” Specifications for this unit are included in Appendix K: Sheet 01 Site Plan Showing All Major Noise Generators and Locations. The Appendix includes a site map indicating the locations of these two units. The units are located near the planned northern and southern building locations: P1 is approximately 58 feet from the A/C unit to the property line; P2 is approximately 90 feet from the A/C unit; P3 is approximately 80 feet from the A/C unit, and P4 is approximately 46 feet from the A/C Unit. The Southern A/C unit at the northern property line and the Northern unit at the southern line will not be considered due to distance and shielding by the intervening buildings, which reduces the noise impacts to near zero.

The A/C impacts for P1 is 37 dBA; P2 at 34 dBA; P3 at 35 dBA; and P4 at 40 dBA. For specific path information please see the attached TAP path data sheet.

The site plan (Sheet 01 Appendix K), has these four points labeled ‘P1' through ‘P4'. These points represents areas of potential acoustical impact at the property lines. The “Trane Acoustics Program” (TAP) evaluates this acoustical path and creates a simulation of acoustical impact.

The methodology of (TAP) is as follows:

Trane® Acoustics Program (TAP)

Features of the Trane Acoustics Program (which was used in the analysis) include:

1. Point-and-click, pictorial modeling of equipment (fans, diffusers, etc.) and building components (ceilings, walls, ductwork, etc.) in each sound path.

2. Real-Time calculation and display of sound path sources, attenuators, and summations.

3. Multiple-path analyses e.g. discharge airborne, discharge breakout and unit-radiated sound.

Primary reference and basis of methodology used for analysis:

> *Reynolds, Douglas D. and Jeffrey M. Bledsoe. Algorithms for HVAC Acoustics. Published as part of the American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. ASHRAE), Research Project 556-RP. Atlanta: ASHRAE, Inc., 1991. [ASHRAE, Inc., 1791 Tullie Circle NE, Atlanta, GA 30329]*

Note to reviewer: All analysis provided by TAP are based on Sound Power (S_{WL}) noise source input. Equipment Sound Pressure (S_{PL}) measurements are converted to S_{WL} through the formula S_{WL} = SPL + 20 Log_{10} (distance) + 2 (this is the reverse of SWL to SPL formula used by ASHRAE.) This formula is only an approximation of the actual S_{WL}, and is used only to provide a basis for the analysis. See Appendix L: TRANE Report.

In order to mitigate noise impacts generated by the Carrier heat pumps, a stucco wall enclosure will be required surrounding each heat pump location. According to the current site plans, each enclosure will include 42-inch tall walls and a 30-inch wide “service clearance.”

The 42" Stucco Clad Masonry Screen is to be constructed as follows:

- Stucco Application (to match building)
- #3 Bar (vertical) 16" on center
- 6" X 12" Cinder Block
- Stucco Application (to match building)

4.2 Measurement Equipment

Some or all of the following equipment was used at the site to measure existing noise levels:

- Larson Davis Model 820 Integrating Sound Level Meter, Type 1, Serial # 0316
- Larson Davis Model CA200 Calibrator, Serial # 0292
- Hand-bearing magnetic compass, microphone with windscreen, tripods
- Distance measurement wheel, digital camera

The sound level meter was field-calibrated immediately prior to the noise measurement and checked afterward, to ensure accuracy. All sound level measurements conducted and presented in this report, in accordance with the regulations, were made with a sound level meter that conforms to the American National Standards Institute specifications for sound level meters ANSI SI.4-1983 (R2001). All instruments are maintained with National Bureau of Standards traceable calibration, per the manufacturers’ standards.

5.0 IMPACTS AND MITIGATION

5.1 Exterior

The future noise environment is primarily the result of vehicle traffic traveling on South Mission Road. Without mitigation or proposed project structures, the future 75 CNEL traffic contour will be located approximately 100 feet west of the South Mission Road centerline. The future 70 CNEL traffic contour will be located approximately 135 feet west of the South Mission Road centerline. The future 65 CNEL traffic contour will be located approximately 240 feet west of the South Mission Road centerline. The future 60 CNEL traffic contour will be located approximately 365 feet west of the South Mission Road centerline. For a graphical representation of these contours, please refer to Figure 7: Site Plan Showing Future Traffic CNEL Contours and Noise Measurement Location.

Without mitigation, future traffic noise levels at the proposed courtyard outdoor use recreational area will be 50.2 CNEL. Mitigation to provide an exterior noise level below 60 CNEL will not be necessary.

Table 4, Future Traffic CNEL at Outdoor Use Areas, shows future noise levels at outdoor-use areas. Please refer to Figure 8: Site Plan Showing Future Traffic CNEL at Outdoor Use Areas.

Table 4. Future Traffic CNEL at Outdoor Use Areas

Receiver	Receiver Location	Exterior Traffic CNEL
R-2	Interior Courtyard	50.2

Calculations show that future traffic noise levels at the building facades will range from 45.6 CNEL at the west-facing facade near Unit 1 to 70.3 CNEL at the east-facing facade near Units 20 and 21. Table 5 summarizes the traffic noise impacts to the future exterior building facades. Please refer to Figure 9: Site Plan Showing Future Traffic CNEL at Exterior Building Facades.

Table 5. Future Exterior Building Facade CNEL

Receiver	Facade Location	Exterior Traffic CNEL
R-3	Unit 19 - South Facade	67.4
R-4	Unit 20/21 - East Facade	70.3
R-5	Unit 26 - East Facade	70.1
R-6	Unit 1 - South Facade	64.3
R-7	Unit 1 - West Facade	45.6

5.2 Interior

The State of California requires buildings to be designed in order to attenuate, control, and maintain interior noise levels to below 45 CNEL in habitable multi-family residential space and 50 CNEL or less in office space. Current exterior building construction is generally expected to achieve at least 15 decibels of exterior-to-interior noise attenuation, with windows opened. Therefore, proposed project building structures exposed to exterior noise levels greater than 60 CNEL could be subject to interior noise levels exceeding the 45 CNEL noise limit for residential habitable space.

Future noise levels will exceed 60 CNEL at some of the proposed exterior building facades. Due to the elevated worst-case exterior traffic noise level impacts at these buildings, an exterior-to-interior noise analysis was conducted to evaluate the sound reduction properties of proposed exterior wall, window, and door construction designs. Please refer to Appendix B: Exterior-to-Interior Noise Analysis.

The architectural building plan specifications for the typical exterior wall assembly incorporated into this acoustical analysis are:

- Single layer of ⅞-inch thick stucco
- 2-inch wide by 6-inch deep wood studs, placed 16-inches on-center
- Single layer of 5½-inch thick faced fiberglass (R-19) batt insulation
- Single layer of ⅝-inch thick Type X gypsum board

INSUL evaluation of the exterior wall proposed for this project resulted in an approximate STC rating of 43, which was incorporated into our analysis. Please refer to Appendix C: Sound Insulation Prediction Results.

Our exterior-to-interior analysis also incorporates STC 28 ½-inch thick dual insulating windows as the minimum recommended configuration. The window assembly is constructed as follows:

- ⅛-inch glass
- ¼-inch air gap
- ⅛-inch glass

The listed STC values are based on “Center-of-Glass” test data. Any window and frame configurations may be used as long as they meet or exceed the minimum STC ratings and corresponding octave band performances for the above windows. Window “Center-of-Glass” performance for the recommended windows is given in Appendix C: Sound Insulation Prediction Results.

With the proposed exterior wall assembly, window, and door configurations specified above, all rooms will comply with interior noise code regulations, with windows and doors in a closed position. Please refer to Table 6, showing future interior noise levels with the recommendations made herein.

Table 6. Future Interior Noise Levels with Mitigation Recommendations

Location	Room	Exterior Facade (CNEL)	Minimum Window Rating	Interior CNEL (windows open)	Interior CNEL (windows closed)	Mechanical Ventilation
South Facade	Office	67.4	STC 28	48.5	36.7	Not Required
East/South Facade	Unit 19	70.3	STC 28	53.0	39.3	Required
East Facade	Unit 26	70.1	STC 28	52.8	38.5	Required

Mechanical ventilation, which allows windows to be closed for an extended length of time, is required to achieve future interior noise levels below 45 CNEL in all residential units. The mechanical ventilation shall meet the criteria of the Uniform Building Code (Chapter 12, Section 1203.3 of the 2001 California Building Code, based on the 1997 Uniform Building Code), including the capability to provide sufficient fresh air exchanges, as required by the Code. Fresh air must be supplied to the individual rooms through a separate supply line duct run, often referred to as a “Summer Switch” for circulation of

unheated air. “Make-up air” must be supplied from the outside through a minimum 4-foot duct with two right-angle bends, interior duct insulation, or an equivalent design. The ventilation system shall not compromise the sound insulation capability of the exterior wall or be dependent on ventilation through windows.

The proposed residential spaces were analyzed for worst-case exterior noise impacts. All rooms will have satisfactory interior noise levels, if built according to the wall, window, and mechanical ventilation plans reviewed for this acoustical analysis. These interior mitigation recommendations will satisfy the acoustical requirements necessary to meet the California Code of Regulations, Title 24. Excerpts of typical building plans and elevations are provided in Appendix D.

5.3 Project Related Traffic Noise

5.3.1 Heavy Truck Traffic

Heavy truck traffic associated with move-in and move-out will require heavy transport trucks, equipment service trucks, and grading contractor’s personnel trucks and vehicles. Heavy trucks will be used for approximately 7 days, completing a total of 32 round trips to and from the site. This will result in an additional heavy truck ADT of 10 for these 7 days. For a typical 8-hour workday, this will result in an additional average heavy truck traffic volume of 1 trip per hour for the areas along the truck route.

The trucks will not travel through the residential portions of the community near the project site. The specific truck route will access the site from South Mission Road or Overland Trail. The trucks will return along the same roadways.

Calculations were performed to determine the CNEL increase from existing traffic noise impacts along South Mission Road to those with the additional heavy truck traffic for the initial site grading operations. These calculations show a traffic noise increase of 0.1 dB. This increase to overall existing vehicle traffic noise is less than 3 dB, and therefore considered an insignificant impact.

5.3.2 Project Generated Traffic

According to the Traffic Study for the Country Gardens II project by LOS Engineering, the proposed project will generate additional traffic along South Mission Road, in the vicinity of the project site. The traffic study provides data for existing traffic and existing plus project generated traffic.

The County guideline regarding noise generated by project-related traffic states that in urbanized residential areas with an existing traffic noise level of 60 CNEL or less, an increase to greater than 60 CNEL due to project-related traffic is considered significant. For areas with an existing traffic noise above 60 CNEL, an increase of 3 dB or more due to project-related traffic is considered significant.

Based upon the existing traffic volumes, the traffic noise impacts to the proposed project building nearest to South Mission Road are expected to exceed 60 CNEL. Calculations were performed to determine the CNEL increase due to existing plus project generated traffic.

These calculations show a maximum traffic noise increase of 0.02 dB for existing plus project generated traffic. These increases to overall vehicle traffic noise to the surrounding area are less than 3 dB, and are therefore considered an insignificant impact. Table 7 summarizes the CNEL increases for this roadway. Please also refer to Appendix E: Excerpts of Traffic Study by LOS Engineering.

Table 7: Noise Impacts from Existing and Project-Related Traffic at Nearby Roadway Segments			
Roadway	Existing ADT	Existing + Project ADT	CNEL Increase
South Mission Road	19,822	19,878	0.02 dB

5.4 Temporary Construction Noise

Section 36.410 (b) of the County of San Diego Noise Ordinance states that construction equipment shall not be operated so as to cause noise at a level in excess of 75 dBA for more than 8 hours during any 24-hour period, when measured at the property lines. The County of San Diego Noise Specialist, John Bennett, has requested that this regulation be interpreted as follows: the average eight-hour equivalent noise level of the construction equipment shall not exceed 75 dBA when *averaged each hour* at any property line used for residential purposes. This is in contrast to the previous interpretation, whereas equipment shall not exceed 75 dBA over an *eight-hour average* at a property line used for residential purposes. Please refer to Appendix F: Section 36.410 (b) of the County of San Diego Noise Ordinance.

Construction activities shall be limited to the following hours: 7 a.m. to 7 p.m., Monday through Friday (except legal holidays), and 7 a.m. to 6 p.m. on Saturday. There will be no construction activity on Sunday. Fences and gates will be installed as a control feature to limit after hours access to the construction site.

The project-related construction noise is expected to only occasionally exceed background noise levels for short durations. Grading operations should take seven days to complete. Please refer to Appendix G, which includes correspondence from the engineer (Tom Edgemon of TNBC) outlining the minimal scope of these activities. It is expected that standard earthmoving equipment, such as dozers, graders, tractors, and front loaders may be used. Please refer to Table 8. No proposed work schedule is available for the project at this time.

Table 8. Construction Equipment Noise Levels			
Equipment Type	Range of Noise Levels at 50 feet	Nominal Noise Level, Leq, at 50 feet	Height of Noise Source
Dozer	72 to 96 dBA	86 dBA	12 feet
Grader	73 to 95 dBA	85 dBA	8 feet
Water Truck	79 to 88 dBA	84 dBA	3 feet
Tractors	72 to 96 dBA	84 dBA	---
Front Loader	71 to 96 dBA	82 dBA	12 feet
Truck	76 to 85 dBA	82 dBA	---

Source: Wieland Associates, 1999

For a typical 8-hour period of grading operations, the applicant expects the equipment to operate simultaneously for up to 10% of that time. An assumption of an ambient noise level of 45 dBA was used to determine the 8-hour L_{EQ}.

When the heavy equipment is operated as described above for 10% of 8 hours simultaneously, the average 8-hour equivalent noise level will be as high as 75 dBA at the southern property line. The

average 8-hour equivalent noise level will be as high as 72 dBA at the nearest residential property at a distance of 50 feet south of the southern project property line near the facade of the residence. The average 8-hour equivalent noise level will not exceed the 75 dB noise limit at the western, northern, and eastern property lines. Therefore, no temporary construction noise mitigation is required due to projected grading operations at the project site. Table 9 summarizes the heavy equipment noise impacts. Please refer to Figure 10 for the Preliminary Grading Plan showing heavy equipment and receiver locations. Please also refer Appendix H: Noise Analysis and Calculations.

Table 9. Heavy Equipment Noise Impacts

Noise Source	Unmitigated Noise Level at Southern Property Line (R-4)	Unmitigated Noise Level at Nearest Residential Property (R-5)
Dozer	81 dBA	77 dBA
Grader	80 dBA	76 dBA
Water Truck	76 dBA	73 dBA
Tractors	75 dBA	72 dBA
Front Loader	72 dBA	70 dBA
Truck	70 dBA	68 dBA
All Equipment Operating 10% of 8 hr period	75 dBA	72 dBA

The location of equipment on-site represents a realistic worst-case scenario for property line and nearby residence noise impacts. The average eight-hour equivalent noise level due to temporary grading construction equipment operations will not exceed 75 dBA at the southern property line, and will therefore not require mitigation.

5.5 Temporary Blasting Noise and Sound Associated With Removal of Rocks

According to Tom Edgemon, blasting or drilling noise will no longer exist:

“We now propose to NOT blast or drill the granite boulders on site as I will tractor place them within the landscape “fabric” of the site. The specific site location plans area underway and will be monitored and directed by Archeologist Dennis Gallegos.”

The acoustical impact of this proposed tractor use is sufficiently accounted for in Tables 8 and 9.

The location of equipment on-site represents a realistic worst-case scenario for property line and nearby residence noise impacts. The average eight-hour equivalent noise level due to temporary grading construction equipment operations will not exceed 75 dBA at the southern property line, and will therefore not require mitigation.

6.0 CERTIFICATION

The findings and recommendations of this acoustical analysis report are based on the information available and are a true and factual analysis of the potential acoustical issues associated with the Country Gardens II project in the Community of Fallbrook, County of San Diego, California. This report was prepared by Michael Burrill, John Gorr, Jessica Rasmussen, and Douglas K. Eilar.

John Gorr, Acoustical Consultant

Doug Eilar, Principal

Alan Mastriano, Acoustical Consultant

7.0 REFERENCES

1. 2001 California Building Code, Based on the 1997 Uniform Building Code, Appendix Chapter 12, Division II - Sound Transmission Control, Section 1208 - *Sound Transmission Control*.

2. 2001 California Building Code, Based on the 1997 Uniform Building Code, Chapter 12, Section 1203.3 - Ventilation.

3. 2001 California Noise Insulation Standards, effective 11/01/02, Based on 1997 Uniform Building Code, California Code of Regulations, Title 24.

4. California Department of Transportation, Sound32 Traffic Noise Model.

5. County of San Diego Noise Element to the General Plan.

6. County of San Diego Noise Ordinance

7. County of San Diego Fire Code

8. Harris, Cyril M., Handbook of Acoustical Measurements and Noise Control, 3rd Edition, Acoustical Society of America, 1998

9. Heeden, Robert A., Compendium of Materials for Noise Control, U.S. Department of Health, Education and Welfare, National Institute for Occupational Safety and Health, November 1978.

10. Irvine, Leland K., Richards, Roy L., Acoustics and Noise Control Handbook for Architects and Builders, Kreiger Publishing Company, 1998

11. NBS Building Sciences Series 77, Acoustical and Thermal Performance on Exterior Residential Walls, U.S. Department of Commerce/National Bureau of Standards, November 1976.

12. Western Electro-Acoustic Laboratory, Inc., 1711 Sixteenth Street, Santa Monica, California 90404, 213-80-9268, Sound Transmission Loss Vs. Glazing Type, Window Size and Air Filtration, January 1985. The research described in this report was prepared for the California Association of Window Manufacturers, 823 North Harbor Boulevard, Suite E, Fullerton, California 92632, 714-525-7088.